REMARKS

After entry of the present Amendment, claims 1-17 and 19 remain pending in the present application with claim 1 in independent form. No claims have been amended through the present Amendment. Claims 11-13 have been cancelled through the present Amendment. Claim 18 was previously cancelled. No new claims have been added.

Claims 11 and 13 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,960,850 to Billet et al. Claims 11 and 12 stand rejected under 35 U.S.C. §102(b) as being anticipated by German Patent Publication No. 3500080 to Troicky et al. Claims 1-8 and 11-17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the article entitled "Plasma Spray Synthesis of Nanomaterial Powders and Deposits" to Karthikeyen et al. in view of Japanese Patent Publication Nos. 11-198281 and 11-256338 to Bessho. Claims 15-17 stand rejected under 35 U.S.C. §103(a) over Karthikeyen et al. in view of the Bessho references and further in view of PCT Publication No. WO2002/35576. Claims 9, 10, and 19 have been indicated as allowable.

In view of the cancellation of claims 11-13, the rejections under 35 U.S.C. §102(b) are moot. Thus, the only remaining rejections are those under 35 U.S.C. §103(a), which the Applicants respectfully traverse.

Claim Analysis

The Applicants concur with the Examiner's claim analysis with regard to the liquid precursor and the product-by-process claims. However, the Applicants respectfully submit that the Examiner's assessment of the claimed "non-thermal equilibrium plasma" is in error. More

specifically, the Examiner has interpreted this claim term only based upon the words "non-thermal", and has ignored the word "equilibrium". More specifically, the Examiner has interpreted the phrase "non-thermal equilibrium plasma" as requiring that there be no source of thermal energy whatsoever, which is a misinterpretation. A concise definition of "non-thermal equilibrium plasma" can be found in the specification of the instant application as filed. Referring to page 2, lines 3-5 of the application as originally filed, "plasmas, . . . particularly those at low pressures . . . where collisions are relatively infrequent, have their constituent species at widely different temperatures and are called 'non-thermal equilibrium plasmas'." Paragraph [0005] on Page 2 of the instant application as filed provides further explanation of the heat distribution within the non-thermal equilibrium plasmas. In effect, the free electrons in such plasmas are very hot, whereas neutral and ionic species remain cool. As a result, total system heat content of the non-thermal equilibrium plasmas is low and the plasma operates at close to room temperature. Conversely, in plasmas such as flame-based plasmas, the plasmas are very hot and all of their microscopic species are in approximate thermal equilibrium. Thus, the Applicants respectfully submit that the Examiner's statements with regard to the interpretation of "non-thermal" plasmas represent misinterpretations of the claim elements to this effect, that "non-thermal equilibrium plasmas" are sufficiently described in the application as filed, and that the Examiner's statements with regard to "non-thermal" plasmas have no effect on the scope or interpretation of the present claims.

Rejections Under 35 U.S.C. §103(a)

As the Examiner is aware, the question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966). *See also KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. at 1734, 82 USPQ2d at 1391. After analyzing the outcome of *KSR Int'l Co. v. Teleflex Inc.*, which reinforced the holdings of *Graham v. John Deere Co.*, the USPTO has determined that as part of the analysis in formulating a rejection under 35 U.S.C. §103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed, as evidenced by the Memorandum from Margaret A. Focarino, Deputy Commissioner for Patent Operations, on the Supreme Court decision on *KSR Int'l Co., v. Teleflex, Inc.*, dated May 3, 2007 and attached as Exhibit A.

In the present Office Action, the Examiner has focused on the disclosure and teachings of Karthikeyen et al. and the disclosure and teachings of the Bessho references. The Examiner, in assessing the differences between independent claim 1 and Karthikeyen et al., has expressly recognized that Karthikeyen et al. does not teach non-thermal equilibrium processes. While the Examiner's conclusion to this effect relied upon the erroneous interpretation of "non-thermal equilibrium plasma" in the context of the present claims, it is clear that Karthikeyen et al. still does not teach non-thermal equilibrium plasmas based on the definitions provided in the instant application as filed. Rather, Karthikeyen et al. teaches use of a conventional atmospheric plasma spray torch to produce a high temperature plasma flame (refer to the second column on

the bottom of page 276 to the top of the first column on page 277 of Karthikeyen et al). Those of skill in the art recognize the plasma system of Karthikeyen et al. as a thermal equilibrium plasma, which is different from the non-thermal equilibrium plasma claimed in independent claim 1 of the instant application.

To supplement the deficiencies of Karthikeyen et al. as it relates to independent claim 1, the Examiner has turned to the Bessho references to teach different types of plasmas. The Bessho references exclusively teach the use of plasma corona vapor deposition (CVD) systems. Those of skill in the art recognize that plasma-CVD systems are non-thermal equilibrium plasmas which, as set forth above, operate at close to room.

While the Examiner has set forth reasons for why he believes that one of skill in the art would make the asserted combination of Karthikeyen et al. and the Bessho references, these reasons are invalid when Karthikeyen et al. and the Bessho references are analyzed and when the teachings of these references are considered as a whole. In particular, detailed analysis of Karthikeyen et al. reveals that **high plasma temperatures are absolutely necessary in the context of the process being performed in Karthikeyen et al.** Thus, there are no reasons for the combination of Karthikeyen et al. and the Bessho references, which teach the use of non-thermal equilibrium plasmas that operate at close to room temperature.

Referring to the second column on page 280 of Karthikeyen et al., a liquid precursor is atomized and injected into a high temperature plasma flame. If residence time of the droplets in the flame is short, incomplete evaporation of solvent in the droplets and condensation of precursor material occurs. The incomplete evaporation of the solvent and incomplete

condensation of the precursor material results in the liquid droplets splashing on a collection surface and then undergoing further reactions, ultimately leading to patchy deposits. Such a result is clearly contrary to the goals of Karthikeyen et al., which ultimately include collection of a solid precursor material. **Based upon the importance of evaporating the solvent in the droplets in the system of Karthikeyen et al., there is little doubt that plasmas that operate at close to room temperature would be completely out of the question for purposes of Karthikeyen et al., regardless of possible advantages such as lower energy requirements**. Further, as made clear from the summarized portions of Karthikeyen et al. set forth above, one of skill in the art would **not** have a reasonable expectation of success in obtaining the product of Karthikeyen et al. by using non-thermal equilibrium plasmas due to their operation at temperatures of close to room temperature.

In view of the foregoing, the Applicants respectfully submit that the reasons set forth by the Examiner to support combination of Karthikeyen et al. and the Bessho references is invalid, and that these references are not properly combinable because there are no valid reasons why one of skill in the art would make the asserted combination. Thus, the Applicants respectfully assert that the rejections under 35 U.S.C. §103(a) relying upon the combination of Karthikeyen et al. and the Bessho references have been overcome, and that independent claim 1 is both novel and non-obvious in view of the prior art.

In view of the foregoing, the Applicants respectfully assert that independent claim 1, as well as the claims that depend therefrom, is in condition for allowance, which allowance is respectfully requested.

The proper fee for a two-month extension of time is included herewith. The Commissioner is authorized to charge any additional fees, or credit any overpayments to Deposit Account No. 08-2789 in the name of Howard & Howard.

Respectfully submitted,

HOWARD & HOWARD ATTORNEYS

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Date

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